REMARKS/ARGUMENTS

The Examiner has objected to claim 1 under 35 U.S.C. 103(a) as being unpatentable under Cohen et al. (US Patent No. 5,384,635). The Examiner contends that Cohen et al. disclose all of the features of claim 1 with the exception of failing to explicitly disclose the timing information. The Examiner contends that Cohen et al. disclose measuring a time interval or a time lapse between the launching and the receipt of the pulses for determining the location of the disturbance (column 2, lines 60 - 68 and column 3, lines 1 - 10 or column 8, lines 30 - 35).

Accordingly, the Examiner contends that it would be obvious to modify Cohen et al. with a claim to timing information in order to determine the location of the disturbance along the fiber.

Applicant respectfully traverses this objection. The Cohen et al. reference seeks a method of locating a cyclic (e.g. periodic) disturbance to a buried optical fiber for fiber health monitoring, such as to prevent or detect damage caused by digging equipment nearby.

Cohen et al. teach away from the use of OTDR and POTDR in column 1, lines 45 - 56 as being unsuitable for this application.

Rather, Cohen et al.'s solution (at column 6, lines 14 - 17) is to use a form of synchronous detection by employing a timing wave in the signal processing to improve signals for low known and fixed frequencies, in the range of 40 to 50 hertz. Cohen et al. indicate that this mixing with the timing wave provides an improved "net" signal after the receiver, provided that the frequency of the disturbance and the timing wave is the same.

The Examiner's contention that Cohen et al. disclose measuring a time interval between the launching and receipt of impulses for determining location is respectfully disagreed

with. In reviewing the cited sections, Cohen et al. clearly indicates that back-scattered signals are routed to detection circuitry which is synchronously controlled, and the time interval between the launching of the pulses and the generation of signals by the detection circuitry are used to provide a determination of the disturbance location. Cohen et al. neither define a system for use on signals without cyclic characteristics, nor do they use timing based on the received pulses directly without timing wave-based processing. Accordingly, this objection is respectfully traversed.

If the frequency of the disturbance is different from that of the timing wave, or the event is transitory, as would be the case in the instant application, where an intruder is detected by causing a non-periodic disturbance, there is no output response to a disturbance at all by the receiver (column 9, lines 54 - 57). Presumably, any signal detected in respect of such a disturbance would be filtered out as noise.

Cohen et al. go on to use a time comparison between the applied signal to the cable and the net signal (after processing with the timing wave) to obtain a location of the cyclic disturbance.

Hence in summary, Cohen et al.'s application is for periodic disturbances to existing, installed cables for health monitoring. Cohen et al. teach away from conventional PODTR and require a timing wave to both detect the cooperative disturbance and as a required step before determining its location.

Moreover, the cable used by Cohen et al. is not inherently designed as part of a sensor but rather one used for communication purposes. Cohen et al. make no mention of a sensor for detecting intruders, namely uncooperative targets which, by their intrusion, provide signals with unknown frequencies, when the sensor cables are installed in specific environments or in deployments for perimeter security such as on fences. Cohen et al. further make no claim for use of directional couplers or circulators. Cohen et al. make no

claim for modifying the fiber for sensing, or combining it with anything for intruder detection system use such as an audio-sensing cable.

The Examiner has also objected to claims 12 and 13 on the same basis. In respect of claim 12 the Examiner contends that it would have been obvious to modify Cohen et al. with a plurality of cables for sensing different characteristics of an object. With respect to claim 13, the Examiner contends that the skilled artisan would have been motivated to modify Cohen et al. by processing the polarization change and the timing information together to facilitate the measuring. Applicant respectfully traverses these objections.

As indicated above, the cable used by Cohen et al. is not inherently part of the sensor but rather one used for communication purposes. There is no teaching to modify the fiber for sensing, or combining it with anything for intruder detection system use, such as with an audio-sensing cable. In any event, claim 12 depends from claim 1, which as indicated above, is submitted to be patentably distinguished from the Cohen et al. reference.

With respect to claim 13, the polarization change and the timing information are processed together in the instant application, because it cannot take advantage, as Cohen et al. does, of the cyclic or periodic disturbance for detection purposes. As indicated above, if the frequency of the disturbance in the timing wave is different, or the event is transitory, there is no output response to a disturbance at all by the receiver in the Cohen et al. reference. Accordingly, the changes with which the Examiner has asserted the skilled artisan would have been motivated to modify the Cohen et al. reference, are not trivial or within the capabilities of an ordinary person of skill in this art. In any event, claim 13 depends from claim 12, which as indicated above, is submitted to be patentably distinguished from the Cohen et al. reference.

The Examiner has objected to claims 2, 1 - 3/5, 1 - 3 /6, 7 and 8 as being unpatentable in view of Cohen et al. and further in view of Spillman (EPO 320 255). With respect to

claim 2, the Examiner acknowledges that Cohen et al. do not disclose the claimed coupler but contends that Spillman discloses a coupler with which it would be obvious to modify Cohen et al.

Applicant relies on the comments with regard to the Cohen et al. reference as set out above.

In addition, Applicant notes that Spillman relates to a frequency domain method of detecting strain in optical fibers embedded in the structure, such as for example flexing in an aircraft. The present application makes no attempt or makes no claim to detect strain but rather only vibration disturbances. There are many strain sensing techniques but to apply strain to the cable typically requires a continuous attachment of the fiber to some structure undergoing strain. This is difficult and very expensive.

The present application, rather, merely tie-wraps the cable to a fence at periodic intervals for purposes of sensing vibration and no such continuous attachment of the fiber is claimed.

Furthermore, the processing in Spillman requires frequency modulation of the laser and other complex techniques requiring two fibers, both a sensing and a reference fiber and as such differs considerably from the present application.

In view of the foregoing, a person of ordinary skill in the art would not be motivated to combine Spillman, which is a frequency domain system, with Cohen et al. which is a time domain system to arrive at a time domain system as set out in the objected-to claims. In addition, the Spillman coupler has additional required ports and legs as it also fundamentally connects to both a sensed fiber and a separate reference fiber, unlike the present application. Accordingly, Applicant submits that this objection has been traversed.

With respect to claims 5 and 6 (as they depend from claims 1 - 3), the Examiner contends that it would be an obvious design choice to modify Cohen et al. for detecting tamper or disturbances of different types of cables such as an optical telecommunications cable or a non-ranging sensor as claimed to use the system in different environments. Applicant respectfully repeats and relies on the arguments as set out above in support of the contention that claims
1 - 3 of the present application are patentably distinguished from Cohen et al. in light of Spillman.

With respect to claims 7 - 8, the Examiner contends that the claimed optically or electrically based security sensing cable would have been known.

Applicant respectfully repeats and relies on the arguments as set out above with respect to claims 1 - 3 in support of the contention that these claims, which depend from claim 6, which depends from claims 1 - 3 (or 4, to which objection has not been made), are patentably distinguished for the reasons set out above in respect of these claims.

The Examiner has objected to claim 9 as being obvious in view of Cohen et al. and further in view of Udd (US Patent No. 5,627,927). Applicant notes further that the Udd reference teaches a system of using fiber optic grating sensors disposed along or periodically etched into fiber optic cables. These are discrete sensors sensitized to measure temperature or strain at their discrete location. To provide any form of distributed sensing, it would be necessary to create a special and expensive cable with an array of such gratings. This differs considerably from the present application where there is a conventional continuous fiber optic cable which is sensitive to vibration but not temperature or strain along its entire net length and not at just discrete points.

Moreover, at column 10, lines 42 - 48 of the Udd reference, it is clearly indicated that the switch supports strings of (discrete) fiber optic gratings and not sensor cables *per se*. In

this case, the cables are only the waveguides and not the sensors themselves. Since each grating constitutes a sensor, the Udd configuration is effectively both a parallel and series array of sensors which is quite different than the present application where there are parallel disturbance sensing cables and time domain processing.

In any event, Udd teaches against any location of a disturbance based on timing because it is indicated in the Udd reference that it is possible to configure the systems for transmission rather than reflection. Such a configuration would destroy any timing information useful for location purposes.

Thus, in Udd, optical switches are not shown for use in the system and application claimed in the instant application. Accordingly, this objection is also respectfully traversed.

Applicant respectfully submits that all of the outstanding objections have been overcome by way of argument. Applicant believes that no new matter has been entered during this process. Applicant respectfully submits that all of the claims presently standing in the application are patentably distinguished from all of the references of record either taken alone or in any combination. Accordingly, reconsideration and allowance of this application is respectfully solicited.

Conclusion

Should any further fees or payments be necessary for entry of this amendment and further prosecution of this application, the undersigned hereby authorizes the Commissioner to debit and/or credit our Deposit Account No. 16-0600.

Respectfully Submitted,
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